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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BELLO, AGUSTIN

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/774,724	Applicant(s) MOMTAZ ET AL.	
	Examiner Agustin Bello	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-11 and 13-19 is/are rejected.
- 7) ☒ Claim(s) 6, 12 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/7/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5, 7-8, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garrido in the article “A Comparative Study of Two Adaptive Continuous-Time Filters for Decision Feedback Equalization Read Channels” in view of Cranford (U.S. Patent No. 5,940,441).

Regarding claims 1, 7, 8, 14, and 15, Garrido teaches a continuous time filter (e.g. “Forward Equalizer” of Figure 1 described in column 2 of page 89 as operating as a filter and designed using adaptive continuous-time structures) being adjustable (i.e. via adaptation process based on error e_k), wherein the continuous time filter is configured to reduce channel induced pre-cursor interference in an incoming data signal and generate a filtered incoming data signal (i.e. last paragraph of column 1 page 89 where the “forward equalizer is used for precursor ISI cancellation”); a decision feedback equalizer (i.e. the slicer and “Backward Equalizer” of Figure 1), coupled to the continuous time filter, and configured to reduce post-cursor interference in the filtered incoming data signal and output a compensated signal and equalized data (i.e. last paragraph of column 1 page 89 where the “backward equalizer is a non linear post cursor ISI remover”); and a controller (i.e. the summation circuit providing control signals for adaptation based error e_k) configured to receive the compensated signal from the decision feedback

equalizer (i.e. the inputs “+” and “-” to the summation circuit) and estimate an error (e.g. error e_k) of the continuous time filter based thereon, the bandwidth controller further configured to generate a control signal based on the bandwidth error (e.g. error e_k) and to adjust the continuous time filter using the control signal (i.e. adaptation based on error e_k), and thereby reduce the error as determined from the decision feedback equalizer. Garrido differs from the claimed invention in that Garrido fails to specifically disclose that the continuous time filter is one having an adjustable bandwidth or that the estimated error is a bandwidth error, where the bandwidth of the continuous time filter is adjusted. However, Cranford teaches that a continuous time filter having an adjustable bandwidth where a bandwidth error is estimated and used to adjust the continuous time filter is well known in the art (reference numeral 102 in Figure 1; column 2 lines 31-46; column 3 lines 17-20; column 5 lines 1-7). One skilled in the art would have been motivated to employ a continuous time filter having an adjustable bandwidth in order to compensate for loss and distortions of the input signal (column 2 lines 40-46). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to employ a continuous time filter having an adjustable bandwidth as the adjustable continuous time filter of Garrido.

Regarding claim 2, the combination of references and Garrido in particular teaches that the continuous time filter is configured to pre-distort the incoming data signal (i.e. via filtering or equalization or removal of precursor ISI), based on the control signal (i.e. adaptation based on error e_k), to thereby improve an operation of the decision feedback equalizer (i.e. via cancellation of the precursor ISI).

Regarding claim 5, the combination of references and Garrido in particular teaches that the decision feedback equalizer comprises a summer (i.e. summer in Figure 1) that is configured to generate the compensated signal by combining an equalized feedback signal with the filtered incoming data signal.

3. Claims 3, 9, 11, 16, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garrido in view of Cranford, as applied to claim 1 above, and further in view of Wagner (U.S. Patent No. 5,179,302).

Regarding claims 3, 9, and 16, the combination of Garrido and Cranford differs from the claimed invention in that it fails to specifically teach that the continuous time filter comprises at least one cascaded low pass filter. However, Wagner teaches that adjustable filters having cascaded low pass filters are well known in the art. One skilled in the art would have been motivated to employ a filter comprising at least one cascaded low pass filter in order to reduce bit error rate and noise bandwidth (column 5 lines 53-58 of Wagner). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to design the continuous time filter of either Garrido or Cranford so that it comprised at least one cascaded low pass filter.

Regarding claims 11 and 19, the combination of references and Garrido in particular teaches that the decision feedback equalizer comprises a summer (i.e. summer in Figure 1) that is configured to generate the compensated signal by combining an equalized feedback signal with the filtered incoming data signal.

Regarding claim 17, the combination of references and Garrido in particular teaches that the continuous time filter is configured to pre-distort the incoming data signal (i.e. via filtering or equalization or removal of precursor ISI), based on the control signal (i.e. adaptation based on

error e_k), to thereby improve an operation of the decision feedback equalizer (i.e. via cancellation of the precursor ISI).

4. Claims 4, 10, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garrido in view of Cranford and Wagner, as applied to claim 3 above, and further in view of Wu (U.S. Patent No. 6,968,167).

Regarding claims 4, 10, and 18, the combination of references and Wagner in particular teaches that each of the at least one cascaded low pass filter comprises adjustable capacitive loads coupled to their outputs and configured to adjust the bandwidth of the at least one cascaded low pass filter in response to the control signal (reference numeral 42C, 90 in Figure 3; column 3 lines 1-13). However, the combination of references differs from the claimed invention in that it fails to specifically teach a differential pair of transistors used for adjusting the bandwidth. However, Wu teaches a differential pair of transistors used for bandwidth alteration with calibration of capacitors and a filter arrangement with a control word. Wu further teaches an RC low pass filter that can be controlled using a parallel capacitor array (column 44 lines 27, 52-56). One skilled in the art would have been motivated to employ such a structure in order to provide frequency planning, agility, and noise immunity (column 13 lines 35-40).

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garrido in view of Cranford, as applied to claim 1 above, and further in view of Kaneda (U.S. Patent No. 5,179,302).

Regarding claim 13, the combination of Garrido and Cranford differs from the claimed invention in that it fails to specifically teach that the receiver further comprises an optical detector configured to convert the received information signal to an electrical signal. However,

Kaneda teaches that this concept is well known in the art (Figure 4; paragraph [0002]; paragraph [0004]). One skilled in the art would have been motivated to employ an optical detector in order to keep pace with increasing bandwidth demands (paragraph [0002] of Kaneda). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to include an optical detector in the device of the combination of Garrido and Cranford.

Allowable Subject Matter

6. Claims 6, 12, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments filed 06/05/08 have been fully considered but they are not persuasive.

In response to applicant's argument that the modification of Garrido's forward equalizer by using a continuous time filter disclosed by Cranford would disable Garrido's forward equalizer, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, Garrido's disclosure of a continuous time filter and Cranford's disclosure of a continuous time filter with an adjustable bandwidth would have suggested to one skilled in the art that Garrido's continuous time filter could have been a continuous time filter with an adjustable bandwidth. Furthermore,

Cranford clearly provides motivation for one skilled in the art to employ a continuous time filter with an adjustable bandwidth. Therefore, a prima fascia case for obviousness was established in the office action and maintained in this office action.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (571) 272-3026. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Agustin Bello/
Primary Examiner, Art Unit 2613